Case Report Rapport de cas

Star gazing in a dog: Atypical manifestation of upper gastrointestinal disease

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Abstract — A Yorkshire terrier dog was presented for episodes of "star gazing" behavior expressed as upward raising of the head and neck extension with subsequent staring at the ceiling or sky. Erosive gastritis with reflux esophagitis was diagnosed. Treatment of these conditions was associated with resolution of the behavior, suggesting a causal link.

Résumé — Présentation atypique d'une douleur gastro-intestinale haute chez un chien. Un Yorkshire terrier a été présenté pour des épisodes fréquents de 'star gazing,' notés comme une extension du cou et une élévation de la tête vers le plafond ou le ciel. Une gastrite érosive ainsi qu'une oesophagite de reflux ont été diagnostiquées. Suite au traitement de ces deux conditions, une résolution clinique du comportement de 'star gazing' a été notée, suggérant que ce comportement représente une manifestation clinique des pathologies gastrointestinales identifiées.

(Traduit par les auteurs)

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According to Landsberg et al (1) star or sky gazing is an apparent hallucinatory behavior in dogs, and can be an expression of a compulsive disorder. No precise definition of the behavior is currently reported in the literature. According to these authors, the hallucinatory behaviors must be differentiated from signs of neurological conditions of the central nervous system, disorders of the special senses and neuropathic pain syndromes. These animals are either referred to behaviorists or are treated empirically with drugs such as antidepressants or anticonvulsants. Reports presenting this clinical sign in dogs are sparse. Schneider et al (2) reported temporary suppression of a similar behavior in a Bernese mountain dog with Huperzine A, a compound isolated from Chinese club moss with anticholinesterase and N-Methyl-D-aspartate (NMDA) receptor-blocking activities. The dog treated with this compound was diagnosed with complex partial seizure and also exhibited other abnormal behaviors such as fly snapping, lip smacking, and ongoing anxiety.

Other abnormal behaviors in dogs such as excessive licking of surfaces, lip smacking, and fly-biting, although listed by some authors as obsessive-compulsive disorders, have been associated with gastrointestinal (GI) disorders (3,4). In one study, dogs exhibiting fly biting (appearing to be watching something and suddenly snapping at it) (4,5), were consistently extending their neck and raising their head prior to jaw snapping (4). Underlying GI diseases in those fly-biting cases included gastric and/or duodenal eosinophilic or lymphoplasmocytic infiltration, delayed gastric emptying, and gastroesophageal reflux. These reports highlight the potential association between some abnormal repetitive behaviors and GI disease and therefore support the necessity of GI investigation in dogs presenting with "compulsive" disorders.

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Case description

A 4-year-old spayed Yorkshire terrier dog was presented for evaluation of a star gazing behavior described as episodes of abnormal upward extensions of the head and neck with subsequent staring at imaginary objects on the ceiling. The dog had no regurgitation, repeated swallowing, vomiting, or diarrhea. She was energetic and her appetite was normal. Initially, the episodes of star gazing were sparse and single and occurred every few days. Frequency and duration of the abnormal episodes increased progressively over a 12-month period. At presentation, the dog exhibited daily multiple consecutive episodes of star gazing. Episodes were not related to meals or any particular event in the dog's routine. The referring veterinarian documented elevated fasting and postprandial bile acids, 60.1 μmol/L [reference interval (RI): 0.0 to 8.6 μmol/L] and 47.9 μmol/L (RI: 0.0 to 29.8 μmol/L) respectively, and therefore suspected a portosystemic shunt (PSS). Metronidazole and a low protein diet were prescribed. Despite good compliance by the owners, there was no improvement in clinical signs and the star gazing behavior was now observed multiple times daily. Medical

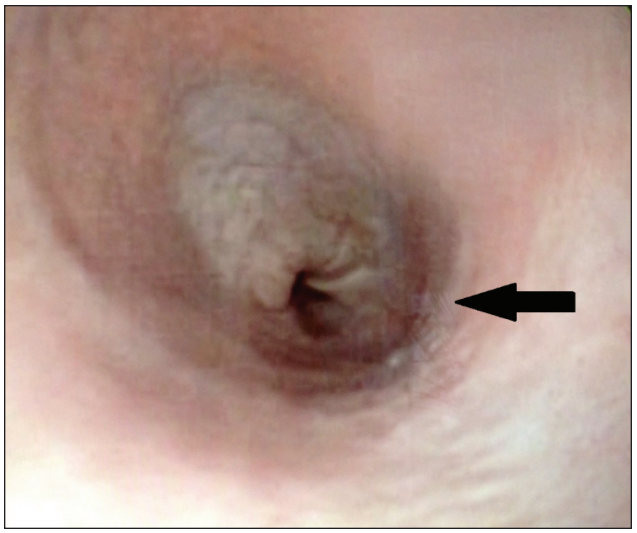

Figure 1. Erythema is shown at the gastroesophageal junction, suggesting gastroesophageal reflux.

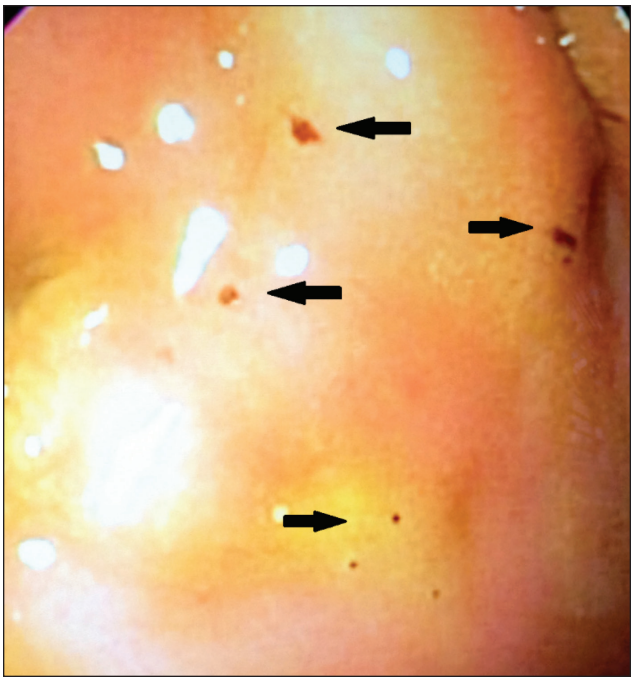

Figure 2. Multiple punctiform hemorrhagic foci are found on the larger curvature of the stomach.

treatment was stopped and 2 mo later the dog was referred to the Veterinary Teaching Hospital. Upon presentation the physical examination was unremarkable, except for minimal dental tartar associated with gingivitis, as well as focal non-pruritic, non-erythematous thickening of the skin at every paw-claw junction of both thoracic limbs. As requested by the owners, the latter was not further investigated since it had been present and stable for years. The owners filmed the abnormal behavior on numerous occasions. The board-certified behaviorist (DF), internist (MCB), and neurologist subsequently reviewed the video clips. No other abnormalities or behavioral changes were reported by the owners. The neurological examination and patient's mentation were normal.

The complete blood (cell) count (CBC) and serum chemistry panel were unremarkable except for a non-significant hyperglycemia [7 mmol/L (RI: 3.4 to 6.9 mmol/L)]. An abdominal ultrasound was performed by a board-certified radiologist. The right lobe of the pancreas was hyperechoic and thickened, suggesting chronic pancreatitis. No evidence of a PSS was found and the liver appeared normal. Measurement of resting plasma ammonia concentration (6 h post-prandial, processed within 30 min) was < 1 μmol/L (RI: 0 to 59 μmol/L) (6,7). A canine specific pancreatic lipase immunoassay (specCPL) was negative.

A gastroduodenoscopy revealed multiple areas of superficial erosions and erythema of the mucosa in the mid and distal oesophagus. The mucosa of the distal oesophagus appeared particularly inflamed and erythematous at the gastroesophageal junction (Figure 1). Multiple hemorrhagic and punctiform foci were found on the larger curvature of the stomach (Figure 2). A large erythematous erosion was also observed in the pyloric antrum (Figure 3). Biopsies were taken from the gastric lesions, margins of the pyloric erosion, and normal-looking mucosa of the stomach and duodenum. Except for a few areas of superficial disruption of the gastric mucosa, histopathology was normal and not indicative of any underlying cause for these erosive lesions. No *Helicobacter pylori* microorganisms were observed.

Based on the history, physical examination, and test results, a diagnosis of erosive gastritis with reflux esophagitis was made. The esophagitis was believed to be secondary to gastroesophageal reflux (GER) based on history and localization of the lesions. Treatment for erosive gastritis with GER was started using liquid sucralfate, 500 mg PO q8h for 10 d, famotidine, 1 mg/kg body weight (BW) PO q24h for 3 d, and omeprazole, 1 mg/kg BW PO q24h for 3 wk. Clinical signs resolved 1 wk after initiation of therapy. Episodes of star gazing gradually reappeared after completion of treatment. Omeprazole was reintroduced and the clinical signs resolved again. The dog required long-term omeprazole treatment to remain asymptomatic as each subsequent attempt to stop the drug led to relapse of the star gazing behavior. Follow-up evaluation was performed 7 mo after presentation and the dog had remained asymptomatic with the omeprazole treatment.

Discussion

This case report describes a dog with star gazing behavior as a possible sign of upper GI disease. One hypothesis to explain the star gazing behavior was that the pain associated with gastric and mostly esophageal disease was expressed as repetitive neck extension and raised head positioning. Medical work-up in this patient and resolution of the clinical signs with specific treatment support a causal link between star gazing behavior and upper GI pain or discomfort.

Esophageal disease and esophageal pain in dogs can be associated with clinical signs such as regurgitation, dysphagia, repeated swallowing motions, ptyalism, odynophagia, retching, gagging, fly snapping, anorexia, and weight loss (4,8,9). However, esophageal pain or discomfort, if not presented with the classical signs of esophagitis (dysphagia and regurgitation), is difficult to evaluate in animals.

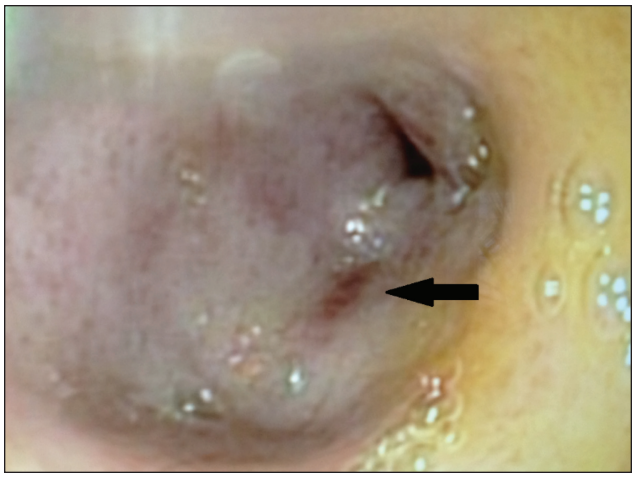

Figure 3. A large erythematous erosion is shown in the pyloric antrum.

One study on post-anesthetic esophagitis in dogs described clinical signs of esophageal pain that included extension of the neck during swallowing and abnormal posturing with the neck extended (10). The latter signs, even if rarely reported as clinical signs of esophagitis, are similar to the signs exhibited by this particular dog. Repetitive neck extension, even as sole manifestation of potential esophageal pain, should prompt medical work-up for upper GI diseases.

It is interesting to compare the clinical presentation of this dog to the symptoms of esophageal pain in non-verbal children. In this subpopulation, gastroesophageal reflux disease can cause a rare but specific presentation called Sandifer syndrome. This condition presents as spasmodic torsional dystonia with arching of the back, neck extension, and sometimes with opisthotonic posturing and may be a vagally mediated reflex response to esophageal acid exposure and pain (11). Children with Sandifer syndrome are often misdiagnosed due to their repetitive behavior, and receive unnecessary medication such as antiseizure drugs. In fact, these atypical movements usually resolve with appropriate antacid therapy (12). These similarities in clinical signs also support GI investigation in dogs with star gazing behavior. Future studies are needed to document absence or presence of additional similarities of gastroesophageal reflux disease in humans and dogs.

Esophagitis is a common cause of esophageal pain and anesthesia-induced GER represents the most common cause of esophagitis in dogs (8,13). In fact, multiple anesthetic agents may decrease the lower esophageal sphincter tone and predispose to GER during anesthesia (8). Intra-abdominal procedures and prolonged fasting also predispose to GER (8). Ingestion of caustic substances, foreign bodies, medication (e.g., doxycycline), chronic vomiting, and structural abnormalities such as hiatal hernias can lead to esophagitis as well (8,9).

Gastroduodenal ulcers, neoplasms, gastroesophageal reflux disease, esophagitis, gastritis, inflammatory bowel disease, and side effects from medication can all cause upper abdominal pain or discomfort (also referred to as dyspepsia) in humans (14). Dyspepsia is described as organic if an underlying disorder is confirmed, and as functional if no underlying condition is identified. The mechanism of functional dyspepsia remains obscure, but gastric inflammation or acidity, motor disorder or visceral hypersensitivity all have been hypothesized (14). Gastroesophageal reflux is another frequent cause of esophageal discomfort in people. Clinical signs are characteristic in adults, with heartburn being a classical symptom of the disease (15). This disorder appears to be less frequently encountered in animals, most probably because it is unrecognized.

Gastroesophageal reflux, not specifically assessed in the present case, is diagnosed in humans by use of standardized questionnaires, response to a proton pump inhibitor therapeutic trial, fluoroscopic studies, upper endoscopy, pH monitoring, and combined impedance and pH monitoring (11,16). Monitoring of pH in the distal esophagus is a valid and reliable measure of acid exposure (11) that could be included in the diagnostic work-up of dogs with star gazing behavior. A continuous pH monitoring system (Bravo pH Monitoring System; Given Imaging, Duluth, Georgia, USA) has recently been validated in dogs and could prove useful in the assessment of GER in dogs (17). Nuclear scintigraphy is another diagnostic tool that can confirm GER. However the scan can only evaluate postprandial reflux and does not provide information about the pH. This technology can give information on gastric emptying and detect reflux episodes and aspirations that occur during or shortly after meals, but late post-prandial acid exposure may be missed (11). Therefore, this diagnostic test could be used for the diagnosis of GER in dogs, but with a relatively lower sensitivity and specificity than pH monitoring.

Gastric erosions and ulcerations can occur as a result of metabolic diseases (hypoadrenocorticism, renal or hepatic disease, pancreatitis), inflammation, neoplastic or paraneoplastic processes, toxins, stress, hypotension, ischemia, drugs, trauma or can be idiopathic (18). In this patient, the erosive gastritis remained idiopathic. No medication predisposing to gastric erosions or ulcers (glucocorticoids, nonsteroidal anti-inflammatory drugs) had been administered prior to the onset of clinical signs. No ingestion of caustic substances or vomiting was reported. Gastrinoma and mastocytoma appeared unlikely based on clinical presentation, physical examination, diagnostic findings, chronic clinical course, and outcome. Since full thickness biopsies were not obtained, some inflammatory or neoplastic diseases in the deeper layers of the intestine and stomach could not be excluded. A sliding hiatal hernia also remains possible as a cause of esophagitis in this patient. This condition is difficult to diagnose and no test can conclusively exclude it because of its intermittent nature. Performance of a positive contrast esophagogram and fluoroscopy could have helped identify this disease (19). Finally, baseline cortisol or ACTH stimulation test was not performed so hypoadrenocorticism was not ruled out. It is therefore unknown if those diseases were present and whether they contributed to the erosive gastritis of this patient.

Hepatic dysfunction, although unlikely, was not ruled out. Fasted plasma ammonia concentration was normal and no biochemical abnormalities other than elevated bile acids were observed. Measurement of fasting ammonia concentration was performed since it is a useful test of liver function that correlates with the clinical grade of hepatic encephalopathy in dogs

(20,21). Ammonia is the only neurotoxin that can be routinely measured in dogs with potential hepatic encephalopathy. Resting ammonia measurement has also been shown to be superior to fasting bile assays, which are relatively nonspecific for detecting congenital or acquired portosystemic shunting in dogs (6,22). The abdominal ultrasound was not suggestive of PSS, portal vein hypoplasia, or hepatic disease but measurement of protein C activity, advanced diagnostic imaging and liver biopsy would have been indicated to conclusively rule out liver disease (23). Further testing was recommended, but declined by the owners. Causes of falsely elevated bile acid results such as blood sampling in a patient that was not fasted should be considered in this patient. Also, fasting bile acids higher than postprandial bile acids may be caused by interdigestive gallbladder contractions and individual variations in intestinal transit time and gastric emptying (23).

The star gazing behavior resolved with administration of omeprazole. Omeprazole increases gastric pH (17) and thus is indicated for the treatment of esophagitis and erosive gastritis. However, omeprazole exerts other biological actions that could have potentially impacted this patient's response. Omeprazole has been reported to decrease cerebrospinal fluid production (24). It is also known to have antiseizure activity in rats, but tolerance to its action develops rapidly (25).

A neurologic condition cannot be completely ruled-out despite a normal neurological examination. An electroencephalogram would have helped to rule out focal seizures (26). Gastrointestinal investigation was initiated first and reflux esophagitis and erosive gastritis were diagnosed. The medical response to treatment of these 2 conditions precluded further neurological investigation, as well as a trial with anticonvulsant medication.

In conclusion, star gazing is an uncommon behavior in dogs characterized by an extended neck and raised head with subsequent staring at the ceiling or sky. Medical evaluation should include upper GI diseases since pain or discomfort associated with these conditions can elicit this clinical presentation. This patient was diagnosed with erosive gastritis and reflux esophagitis. Resolution of star gazing behavior occurred with chronic omeprazole administration. CVJ

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